

# COMPUTING

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Paper 9691/01

Paper 1

## General comments

The Examiners felt that the paper was similar in difficulty to previous sessions. This was supported by the candidates' results which were certainly as good as in previous sessions with, perhaps, a small reduction in poor scripts. Some of the candidates produce really good work and are to be congratulated, as always, in being able to produce such impressive efforts to a difficult set of questions, answered in what is often a second language and in the stressful environs of an exam room.

The evidence of the two different types of question, context based and non context based, providing very different degrees of difficulty to candidates was striking. The final question showed this very forcefully, most candidates being able to define the various utilities, but far fewer being able to relate their use to the copy editor.

The standard of presentation was very high, candidates showing a pride in their work which is very pleasing. The use of diagrams is becoming more prevalent which is encouraging. Centres should bear in mind that the examiners are looking for evidence, in whatever form, and candidates should be encouraged to use whatever form suits them best. The only exceptions are when the question specifies the form that the answer should take, although questions like this are comparatively rare.

The use of bulleted lists is becoming more prevalent. This is to be encouraged as long as the candidate shows a little discipline in writing their answer in this fashion. Where this ceases to be acceptable is when the list becomes a list of everything the candidate can possibly think of on the basis that if the candidate writes down enough, some of it stands a chance of being correct. This is a high level qualification and examiners do expect candidates to show a sense of discrimination in their responses. Examiners will, to a great extent, find the worthy responses but should not be expected to search through long lists.

There was no evidence of time trouble being suffered by candidates and little evidence of problems with language, save the ones listed in the comments on individual questions, below.

## Comments on specific questions

### Question 1

(a) This was a very good discriminator across all but the top of the mark range.

Most candidates could provide 3 methods of information collection (although a sizable proportion gave three stages of the life cycle) though far fewer could give an advantage of using the method. Presumably all candidates will be doing some information collection for real, quite soon when they start their project, hopefully, by then, they will be able to be a little bit more discerning about the various methods available to them than they are at the moment.

(b) Fewer were able to answer this part effectively. This is expected as this was meant to be a far harder question. It isn't really, because it is simply another section of the life cycle but examiners think candidates find this harder because this stage seems to come after the problem is solved. It is 'tacked on at the end' and is consequently less obvious to explain. The acceptable responses to this and all other questions on the paper are available in the published mark scheme which Centres are encouraged to consult.

## Question 2

- (a) Some good responses here. The only problem was caused by trying to relate it to the scenario, but plenty of detail was given so candidates did not seem to find this particularly troublesome.
- (b) Candidates should not use the same words that are in the question to provide their answer. A typical answer here was that the records were in sequence. **(ii)** was poorly answered. The almost universal response was that having a sequential file made it easy to find a particular record and also to add a new record when a new worker arrived. Both of these are very good reasons for not using a sequential file.
- (c) Well answered.

## Question 3

- (a) The question quite clearly instructed the candidates to "Write down the outputs..." Many candidates were penalised for writing down 'C = 4' or some other variant along those lines. This algorithm style question needs to be answered quite specifically. The exercise is a test in whether the candidate can read a set of instructions clearly and the examiner is, as much, looking out for a failure to follow instructions in the algorithm as they are looking for evidence of finding a correct response.
- (b) Again, this is an algorithm. The question was quite generous in not expecting a specific method for describing the algorithm, but it did need to be well presented and academically rigorous to gain the marks. The most disappointing feature of the responses was the very poor nature of the loops used (if at all). The candidates have, presumably, been using these constructs in their paper 2 work during the course of the year and it is surprising to see so few candidates able to translate the knowledge across from one paper to another.

## Question 4

- (a) Well answered.
- (b) The question asked for the factors that should be considered by the analyst. While the majority of candidates answered well, a sizable minority gave the standard design that they would produce. The candidate may have responded that they would make the language easy to understand, while the response that was expected was that the analyst would have to consider the ability of the users in the control room when deciding what sort of language to use.

## Question 5

- (a) Well answered, though you had to feel sorry for the occasional candidate who got the first one wrong and then had to try to make the others fit!
- (b) Very much Centre based. The majority of candidates picked up 5 or 6 marks, the only problem being the need to think of the priority of the interrupt and that it is not automatically dealt with. There were a number of cases where the candidates had learned a generic set of stages in this process and these stages were presented as their answer with no justification in the area of the problem at all. There were others who lost marks because they talked about sending data to a printer rather than the hard drive.
- (c) Well answered by those who had picked up the marks in part **(b)**, because they obviously understood the situation. However, for many others it was a lottery for the two marks, with little offered as justifications.

## Question 6

- (a) Surprisingly few sensible responses which could be given two marks each. The clues were all there in the question and the responses seem to point to a need to do some work with candidates about trying to pick out the important details in the stems of questions.
- (b) Well answered.

- (c) A very good discriminator. Many picked up the full 4 marks in confident fashion. Many others were rather reticent with their justifications while many others ignored the part of the question which said '...to allow this communication' and simply said a keyboard and a word processor or equally inappropriate pieces of hardware and software.

#### Question 7

- (a) Some very good responses, though a common answer is that a message sent by circuit switching does not need to be reassembled at the destination. This is not true as messages will be sent in packets anyway so they will need to be reassembled, the point is that they will be in the correct order, so they do not need to be reordered which is true of packet switched messages.
- (b) The ASCII explanation was generally fine, though the explanations of checksum and parity were generally less well done. This is a perennial problem, one where the use of language causes a stumbling block to many candidates. Examiners do try to understand the meaning in responses that a candidate is trying to convey, but if the response is wrong the examiner can do nothing. A typical response for the checksum was that all the bits were added up. Faced with this an examiner will think that they know what the candidate was meaning to say, unfortunately what they did say was understandable and wrong. There were a large number of candidates who described a check digit calculation instead of a checksum.

#### Question 8

Well answered. These were intended to be simple marks which would reward weaker candidates at this end of the paper, and so it proved.

#### Question 9

This question proved to be an excellent discriminator across the whole attainment range.

The first problem was understanding that these were pieces of software, not hardware. The big problem here was (iii) which many candidates interpreted without the 'r' and so thought they were storage devices. The second problem was interpreting (i) and (ii) as user software so the answer was aimed at correcting and editing the content of a book. The final problem which was only satisfactorily solved by more able candidates was explaining how or why the copy editor would use the software. In (iv) most candidates explained what compression software did (though many said 'it compresses a file') few were able to say something sensible like '... the copy editor would compress files before sending them as attachments to emails in order to speed up the process'.

# COMPUTING

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Paper 9691/02

Paper 2

## General Comments

It was good to see so many short, high quality pieces of work, the vast majority of which were accurately marked.

Many candidates had chosen fairly straightforward ideas. So long as there is a need to define a file with a variety of fields, and manipulate that file to some end, candidates can use the programming skills that this paper asks for. Many Centres had got their candidates to list examples and reference where these skills had been used. This made marking the project simpler for the teacher and the Moderators. It also acted as a check list for the candidates.

The good projects were usually about 30 -35 pages long. They had a detailed design of their program, along with detailed annotation within the code listing that taken together enabled anyone else to clearly see what the program did, how it was constructed and how it could be maintained. The testing produced a table of expected results to show that the program worked, along with the hard copy evidence, and then sufficient detail to enable a user to implement the program.

The main features of projects that were not highly marked were:

Producing projects that had elements of a system problem. There is no expectation or need in this paper to have an end user, an investigation, evaluation, and user letters.

Producing projects where some of the code was written using wizards or autocode facilities. Such code will not have been written by the candidate.

Writing code without annotation. The Moderators often see pages of well written code, but have no idea what it might do. It needs annotating so that the code can be related to the design, and so that any other person who wants to understand the code can do so without being an expert in the language used. Some candidates wrote a comment at the top of some blocks of code, but good annotation need to be a comment after most lines of code.

Limited testing. It was common to just test a few different items of data being entered to see if the validation methods work. This does not show that the whole program works.

These aspects were also the ones that teachers had the main difficulties over the allocation of marks.

Overall the quality of the work had gone up from the June 2006, and the Moderators enjoyed seeing so many well programmed, well documented projects.

# COMPUTING

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Paper 9691/03

Paper 3

## General comments

The examining team were agreed that this paper was no more difficult than in previous sessions, although some of the questions caused problems because they allowed candidates to think they could answer in a manner which was appropriate to paper 1 but not to this, more advanced, part of the syllabus. Examples of these questions and the errors made by candidates are outlined in detail below.

There was plenty of scope for able candidates to demonstrate their ability and it is good to be able to report that there are a number of candidates in this category whose papers are a joy to mark. Too many candidates, however, are not ready for this paper, either because of their knowledge or because of their maturity and the way that they attempt to answer the questions. It is not the intention of the assessment to highlight candidates who are unable to score marks in double figures though this happens. Candidates in this position really should not be made to endure the examination room. The experience must be terribly demoralising for them and one would hope that they could be identified and saved from the humiliation as nothing can be achieved.

The standard of presentation continues to impress. There were few candidates whose responses were difficult to decipher and the examiners do everything they can to understand the points that such candidates are making. It was good to see so many candidates answering in bulleted form, however, it should be mentioned that encouragement to answer in this way is not a licence for single word responses or communicating in some code which does not recognise the need for verbs. The use of bullets is invaluable to many candidates in order to help them arrange their thoughts in a coherent manner, not so that they can ignore the need to communicate in English. The examiner does not penalise such answers but the answers penalise themselves because they so often become ambiguous. For example in **Question 3 (ii)** “-One department is made to use the new system” is certainly worth a mark. “-One part uses new system” is ambiguous because it could equally apply to a phased introduction.

There was some indication of time trouble for a minority of candidates. These candidates were the ones who wrote very long prose style answers to questions. This is the other extreme to those who are cutting the responses so much that they become ambiguous. Both sets of candidates penalised themselves, in different ways. The happy medium lies somewhere in the middle and it is not suggested that a particular method for answering either fits all candidates or all questions, but it should be part of the examination preparation to learn and practice a suitable answering technique.

There were plenty of diagrams, particularly in **Question 10**. These should be encouraged. Candidates are advised to use any method with which they are comfortable in order to express themselves, the examiners will always credit knowledge, however expressed, as long as the meaning is understandable.

## Comments on specific questions

### Question 1

- (a) The first three parts were very accessible to candidates. Indeed this was simply an alternative way to ask the fetch execute cycle. It was unfortunate that so many candidates wasted their time in describing the fetch execute cycle which did not answer the question, but happily most went on to then answer the question as set, having wasted a considerable amount of time. Again, examination technique was shown to be poor on many occasions. These first three parts could be a good test of a candidate's readiness to take the examination, as a failure to understand these shows a distinct failure to understand the basic bookwork necessary for this module. Part **(iv)**, however, was a little different, it fitted here because it is a register of the computer but was outside

the normal fetch execute cycle, and it showed with very few candidates picking up the 2 marks available.

- (b) Some evidence of being able to suggest that parallel processing used more than one processor, but little else. The majority gave the stock answer that parallel meant having more than one wire to send data down and then decided that the application was either a bank or a supermarket, very un A2 responses.

### Question 2

Good answers, but then, most have had experience of actually using these concepts in the project work, so were able to relate those experiences here. The one exception tended to be the secondary key. The acceptable response to this and all other questions on the paper are available in the published mark scheme.

### Question 3

This question, once again, caused great problems to almost all candidates. This question is very similar to a question which might appear on paper 1. The difference is in the fact that the question starts with an application and then finishes with the words '...consider the effects of each method in this application.' The three methods stated in the question were worth three marks each, the vast majority of candidates made sure that their maximum mark was three for the whole question because the response was totally generic and not related. "Parallel implementation is costly. "is not worth a mark whereas "...but it is worth it because the results are so important to candidates" is.

A number of candidates were unable to go further than saying that Pilot is when part of the system is upgraded. This does not make a distinction with phased because the word 'system' is ambiguous as it could refer to the computer or business system.

### Question 4

Many candidates wrote long explanations of compilation, again wasting their time and showing a poor technique. Some forgot to mention the final stages having dealt with the lexical and syntactic stages, which gained no marks. It was encouraging to see such a high proportion of candidates producing well presented and accurate responses about linkers and loaded.

### Question 5

- (a) Most candidates scored well here, although, surprisingly, BCD caused many problems, unfortunately in some cases the candidate used up hexadecimal here and then had no sensible answer for (iii).

- (b) Very few candidates understood the significance of the MSB, the most common answer being 210.

The addition was done quite well with most candidates losing the carry but not knowing the significance of the carry in = carry out. The almost universal conclusion was that because there had been a carry out the answer must be wrong.

### Question 6

The word 'other' in the question was even written in bold, yet the majority of candidates chose to ignore this and wrote about working from home. This changed the question into the classic paper 1 type question and earned them no marks. Others seemed to take their inspiration from the question paper and wrote about anything from working for an examination board to (very popular) using robots on Mars. The question is almost straight from the syllabus and was about none of these things, it was about the ways in which the use of computers change patterns of work. Centres are strongly advised to look at the published mark scheme for this question.

### Question 7

Most candidates scored a mark in part (a) for the idea of a web page and then went on to score 3 marks in part (b) for three features, though describing how to implement them, or a detail about what they are proved more difficult. There were a number of Centres whose candidates showed no indication of understanding the concept of html at all. Centres should be very careful about picking and choosing from the syllabus content, it can be very dangerous.

### Question 8

- (a) This was intended as a safe 4 marks for the majority of candidates. Very few candidates were able to suggest 4 sensible input and output devices for a robot. Most candidates simply said 'Sensors' without any qualification, many of them giving this as an example of an output device. Other common devices were wheels, keyboards, mice and monitors. These answers are simply not good enough from candidates at this level.
- (b) Most candidates simply ignored the fact that this robot was to work on Mars, many going in to detailed explanations of programming maps into its processor memory. There were a few good answers but only from the more able candidates, at whom this question was aimed.
- (c) The majority simply gave an explanation of real time and batch processing. Those who went any further generally failed to identify which of the two robots they were writing about.

### Question 9

Again, the majority of responses were very firmly based in the 'paper 1' mode of thought, simply regurgitating the question and saying that the jobs were put in queues according to priorities. It was only the stronger candidates that managed to explain the scheduling process.

### Question 10

- (a) Too many candidates failed to score because they simply wrote about the definitions and did not answer the question as asked. However, many did score well, though few were able to say anything sensible about a function.
- (b) Some candidates will persist in saying that a local variable is "...used in a LAN", while a global variable is "...used in a WAN". Thankfully, only a few said that global variables were used all over the world. Many candidates scored full marks here with well stated definitions.
- (c) Most candidates were unable to answer this sensibly. Some were able to define a stack (one memorable script using three pages showing diagrams of data going in and out of a stack, though to what end is somewhat dubious) while a few gave comprehensive responses and fully deserved the marks.

# COMPUTING

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**Paper 9691/04**

**Coursework**

## **General comments**

This report provides general feedback on the overall quality of project work for GCE Advanced Level Computing candidates. In addition, all Centres receive specific feedback from their Moderator in the form of a short report that is returned after moderation. This reporting provides an ongoing dialogue with Centres giving valuable pointers to the perceived strengths and weaknesses of the projects moderated.

The projects submitted covered a wide variety of topics with better candidates again showing evidence of researching a problem beyond their school or college life. The majority of projects were developed using Access.

In order to have the full range of marks available to the candidate, the computing project must involve a third party end user whose requirements are considered and clearly documented at all stages of the system development. Centres are reminded that the project work is designed to test the candidates' understanding of the systems life cycle, not just the use of software to solve a problem. The requirements are clearly set out on pages 30 to 34 of the syllabus in 'The Guidance on Marking the Computing Project' section. Also these requirements can also act as a useful checklist, for both teachers and candidates, setting out the expected contents of each section.

Again Centres are also reminded that candidates should use this guidance for the expected contents of their reports rather than some of the popular 'A' Level textbooks available for project work, which do not cover the full requirements of the CIE Syllabus. Candidates who prepare their work only using text books and not the syllabus for guidance may miss out vital sections of their reports which reduces the marks available to them.

## **Project Reports and Presentation**

As usual, the presentation of most of the reports was to a very high standard, with reports word-processed and properly bound. However, as mentioned previously, the use of proofreading and a spell checker is to be recommended. In addition, candidates should ensure that only material essential to the report is included so that there is only one volume of work submitted per candidate e.g. the inclusion of many pages printed from Access Documenter is not required. Candidates are reminded that even though letters from end users are very useful in providing evidence for the Evaluation and Investigation and Analysis sections, these letters should be originals, preferably on headed notepaper, signed by the end user and not typed out by the candidate.

The submission of magnetic or optical media is not required and the Moderators do not consider it.

It is strongly recommended that the structure of the candidate's report follows that of the mark scheme set out in the syllabus. This allows both teachers at the Centres and Moderators to easily check that work for all sections has been included.

## **Project assessment and marking**

It was pleasing to note that the standard of teacher assessment was close to the agreed CIE standard in many cases. However some Centres' assessment was generous, particularly where clear evidence of user involvement was not included in the candidate's report. Also credit was sometimes given when some of the required parts of the systems life cycle were not addressed practically with the end user e.g. Implementation and Evaluation.



Unfortunately not all Centres provided a breakdown of marks showing the marks given for each sub-section of the syllabus. Centres are reminded that they must use the mark scheme as set out in the syllabus and also include a detailed breakdown of the marks awarded for each sub-section together with a teacher commentary as to why the marks awarded fitted the criteria for that sub-section.

The Centres that provided this type of commentary were far more likely to have accurately assessed the project work provided by their candidates. Also, comments from the teacher and references to appropriate pages in the candidate's report greatly aid the moderation of the projects, allowing Moderators to clearly identify why the teacher had awarded marks for each sub-section. These comments also allow the Moderators to provide more detailed feedback to the Centres on the accuracy of the Centre marking.

### **Comments on individual sections**

The comments set out below identify areas where candidates' work is to be praised or areas of concern and are not a guide to the required contents of each section.

#### **(a) Definition Investigation and Analysis**

##### **(i) Definition - nature of the problem**

Most candidates described the organisation and some described the methods used but only the better candidates identified the origins and form of the data.

##### **(ii) Investigation and Analysis**

Candidates should clearly document user involvement and clearly state agreed outcomes. To gain good marks for this section, candidates need to consider carefully the evidence obtained from interviews, observation of the existing system and user documents, and then ask follow up questions to fill in any gaps in the knowledge obtained about the current system or requirements for the new system. Also alternative approaches need to be discussed in depth and applied to the candidate's proposed system in order to obtain high marks. Centres are again reminded that the system proposed does not have to cover more than one area of the business or organisation chosen.

#### **(b) Design**

##### **(i) Nature of the solution**

Centres are again reminded that the requirements specification set out in the analysis needs to be discussed with the user leading to a set of agreed, achievable and measurable objectives. These objectives will then form the basis for the project evaluation. Many candidates clearly proposed data structures and designs for input screens but then forgot to provide a detailed description of the processes to be implemented and designs for the required outputs.

##### **(ii) Intended benefits**

Most candidates described the merits of the intended system.

##### **(iii) Limits of the scope of solution**

Again, this year it was pleasing to note that more candidates were providing appropriate evidence for this sub-section.

**(c) Software Development, Testing and Implementation**

**(i) Development and Testing**

Evidence of testing needs to be supported by a well-designed test plan that includes the identification of appropriate test data, including valid, invalid and extreme cases, together with expected results for all tests. The test plan should show that all parts of the system have been tested. Again, many candidates only tested the validation and navigation aspects of their system, and omitted to test that the system did what it is supposed to do, thus not being able to gain marks in the highest band for this section.

**(ii) Implementation**

Many Centres frequently mark this sub-section too generously, as high marks cannot be given unless there is written evidence from the end user that they have used the system and agree with the strategy for implementation. The implementation plan should contain details of user testing, user training and system changeover that have been both discussed and agreed with the user.

**(iii) Appropriateness of structure and exploitation of available facilities**

It was pleasing to see that most candidates are discussing the suitability of both hardware and software and that better candidates provided a log of any problems encountered together with details of how these problems were overcome.

**(d) Documentation**

**(i) Technical Documentation**

The standard of work provided for this section is high, with most candidates producing a stand-alone technical guide that includes most of the following: record, file and data structures used; database modelling and organisation including relationships, screens, reports and menus; data dictionary; data flow (or navigation paths); annotated program listings; detailed flowcharts; details of the algorithms and formulae used. Better candidates also included specifications for the hardware and software on which the system could be implemented.

**(ii) User Documentation**

This section was completed to a good standard by most candidates. Centres are again reminded that for full marks the candidate must include an index and a glossary, and the guide needs to be complete including details of backup routines and common errors. Also good on-screen help should exist where this is a sensible option.

**(e) Evaluation**

Many candidates still do not complete this section in sufficient detail. There are guidelines on the required contents, clearly set out in the guidance for marking projects section of the syllabus

**(i) Discussion of the degree of success in meeting the original objectives**

Few candidates considered each objective in turn and indicated how their project met the objective or explained why the objective was not met. Centres are reminded that for high marks to be obtained candidates need to include results from the use of user defined, typical test data as part of this discussion.

**(ii) Evaluate the users' response to the system**

Again Centres are reminded that this response needs to be clearly provided by the end-user showing that they have used the system, not just reported by the candidate. The candidate can then evaluate that response. Evidence for this section should be original letters, preferably on headed notepaper, signed by the end user and not typed out by the candidate.

**(iii) Desirable extensions**

Most candidates identified possible extensions but sometimes forgot to identify the good and bad points of the final system.